

Coronavirus and its Preventive Measures

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ABSTRACT

COVID-19 is a type of coronavirus belonging to the family Coronaviridae. It is thought to originate from bats and spread to people in Wuhan, China. It is spread by inhalation or close interaction with droplets from the infected person which have an incubation period of 2 to 14 days. The symptoms of the infection include fever, cough, sneezing, difficulty in breathing, sore throat and tiredness. The diagnosis of the diseases is done by collecting the sample from the upper and lower respiratory tracts of the infected person. There are certain preventive measures for this diseases include vaccination, personal hygiene, face covering. This article deals with in-depth information on COVID-19 as it discusses the disease transmission, symptoms, diagnosis, treatment, prevention and post COVID conditions.

KEYWORDS: Covid-19, Post COVID conditions, Pandemic, coronavirus, Novel coronavirus

INTRODUCTION

Coronavirus disease (COVID-19) is an infectious disease caused by a newly discovered coronavirus. Most people infected with the COVID-19 virus will experience mild to moderate respiratory illness and recover without requiring special treatment. Older people and those with underlying medical problems like cardiovascular disease, diabetes, chronic respiratory disease, and cancer are more likely to develop serious illness. The COVID-19 virus spreads primarily through droplets of saliva or discharge from the nose when an infected person coughs or sneezes.

ABOUT CORONAVIRUS

Corona virus are single stranded (positive sense) RNA virus with distinct protruding spike glycoproteins visible on the viral surface. Experts named the newly identified virus as severe acute respiratory syndrome coronavirus 2 (SARS – CoV-2).

How to cite this paper: Dr. R. Mahenthiran | Sharmila. R | Deepa. S | Barath Kumar. R "Coronavirus and its Preventive Measures" Published in International

Journal of Trend in Scientific Research and Development (ijtsrd), ISSN: 2456-6470, Volume-5 | Issue-5, August 2021, pp.1963-1969,

URL: www.ijtsrd.com/papers/ijtsrd43938.pdf



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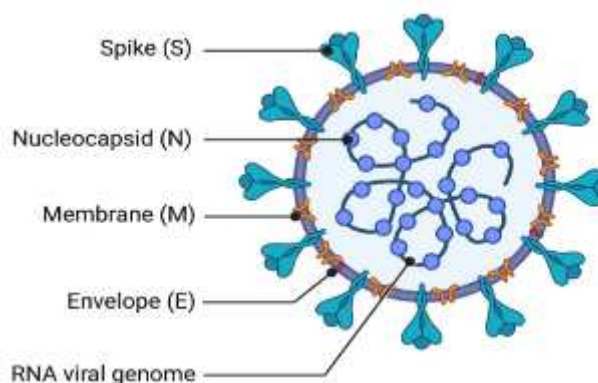


Figure 1: Structure of coronavirus

[Source: <https://www.biophysics.org/blog/coronavirus-structure-vaccine-and-therapy-development>]

Many researchers believe that SARS – CoV-2 first infect bats before spreading to other animals including humans. Scientists are still investigating its source and initial pattern of spreading.

Transmission of the virus takes place when a person:

- Coughs or sneezes without covering their mouth dispersing droplets containing the virus into the air
- Has physical contact with the person who has infection
- touches a surface that contains the virus, then touches their nose, eyes, or mouth

Many people with COVID-19 experience a relatively mild form of the disease that does not require specialist treatment. They isolate themselves in their house itself. But People with a higher risk of severe COVID-19 symptoms include older adults and those with underlying medical conditions, including high blood pressure, heart and lung problems, diabetes, and cancer. They develop severe breathing problems and need to spend time in the hospital. In some cases, it is fatal. According to the CDC, most children with COVID-19 have mild or no symptoms. Fewer children have developed COVID-19 than adults. That said, infants and children with certain medical conditions may have an increased risk of severe illness and death. Although most of the people with COVID 19 get better within week of illness, some people experience Post- COVID conditions include:

Long COVID:

Long COVID is a range of symptoms that can last weeks or months after first being infected with the virus that causes COVID-19 or can appear weeks after infection. Long COVID can happen to anyone who has had COVID-19, even if the illness was mild, or they had no symptoms.

Multiorgan Dysfunction:

Multiorgan dysfunction can affect most body systems like heart, lung, kidney, skin and brain functions. Multiorgan effects can also include conditions that occur after COVID-19, like multisystem inflammatory syndrome (MIS) and autoimmune conditions. MIS is a condition where different body parts can become swollen. Autoimmune conditions happen when your immune system attacks healthy cells in your body by mistake, causing painful swelling in the affected parts of the body [1].

Fungus after COVID:

Mucormycosis, a dangerous infection known as black fungus. These fungi exist in the environment all over the world, especially in soil and decaying organic matter such as leaves, compost piles, or rotten wood. The cleanliness of the hospital, equipment contamination are some of the causes for the black fungus.

CURRENT POPULATION AND CORONA CASES:

The current world population is **7.9 billion** as of July 2021 [2]. Total corona cases so far is 18.3 crore. The ratio is **7900:183**.

The current population of **India** is **1,393,568,297** as of Saturday, July 3, 2021^[3]. Total corona virus so far 3.05 crores [3].

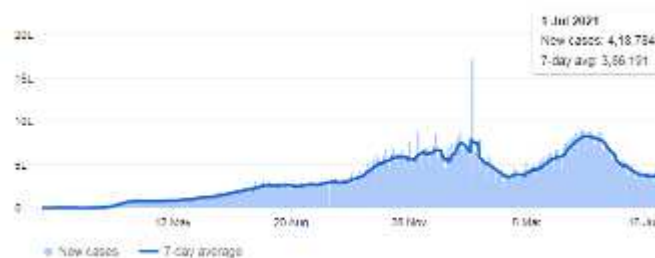


Figure 2: Graph showing daily coronavirus affected cases

SYMPTOMS:

People may start to experience symptoms 2 – 14 days (because incubation period of coronavirus is 14 days).

It includes

- fever
- chills
- a cough
- shortness of breath or difficulty breathing
- a sore throat
- congestion or a runny nose
- fatigue
- a headache
- muscle pain
- a loss of taste or smell
- nausea, vomiting, or both
- diarrhoea

Some of the symptoms of flu and COVID-19 are similar. Influenza (Flu) and COVID-19 are both contagious respiratory illnesses, but they are caused by different viruses. COVID-19 is caused by infection with a new coronavirus (called SARS-CoV-2), and flu is caused by infection with influenza viruses. Testing may be needed to help confirm a diagnosis.

POST COVID CONDITIONS:

Multiorgan Dysfunction: As per recent data COVID-19 mainly affect these organs and body parts:

Lungs - pneumonia associated with COVID-19 can cause long-term damage to the tiny branches of air tubes in the lungs, (alveoli) where the lungs and the blood exchange oxygen and carbon dioxide during the process of breathing in and breathing out. Scar tissue in the lungs can lead to long-term breathing problems.

Heart – patients post COVID-19 recovery have shown irreversible tissue death of the heart muscle, even in people who experienced only mild COVID-19 symptoms. This may increase the risk of Myocardial infarction (MI) resulting heart failure or other heart

related life-threatening complications in the future. **Brain** – there are many reports where young people with COVID-19 also experienced neurological symptoms include muscle weakness, tingling or numbness in the hands and feet, and can eventually cause paralysis (Guillain-Barre syndrome), dizziness, sudden blackout, confusion, delirium, seizures, stroke. COVID-19 may also increase the risk of developing Alzheimer's disease and Parkinson's disease. **Kidney** – patients affected with COVID-19 can develop sudden loss of kidney function, known as acute kidney injury. Dialysis may be necessary in severe cases, but this type of kidney damage can sometimes be reversed. People with CKD are at higher risk of developing a severe symptoms post COVID-19 recovery. So it's important to take all the necessary precautions to prevent infection [4]. **Diabetes** – Though a common ailment, it is seen as a complication even post COVID. It is a chronic disease in which the blood glucose or the blood sugar gets very high. Insulin, the hormone which is produced by the pancreas, helps glucose to get into the cells. But when the body does not make enough glucose, it stays in the blood causing various health issues.

Various factors can trigger this state which includes anxiety, stress and loneliness. This is more so for patients who stay alone for weeks in hospitalization or isolation, thus making insomnia a post COVID complication [5].

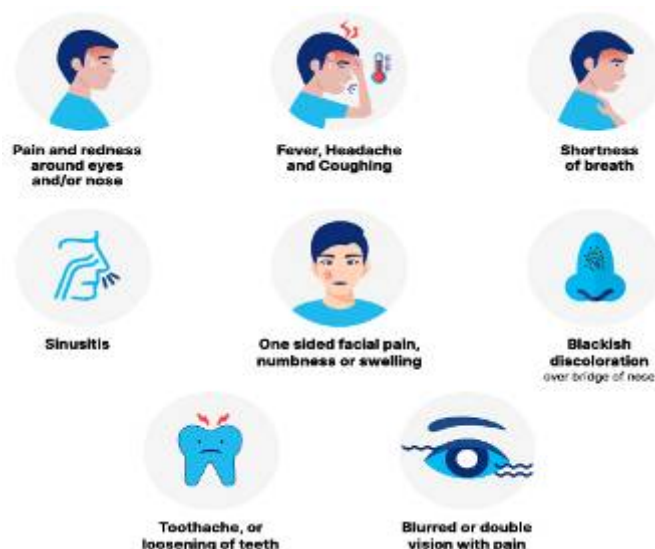


Figure 4: Symptoms of Black fungus

TESTING:

COVID-19 tests are available that can test for current infection or past infection.

- A viral test tells if a person have a current infection. Two types of viral tests can be used: nucleic acid amplification tests (NAATs) and antigen tests.
- An antibody test (also called as serology test) tells if a person had a past infection. Antibody tests should not be used to diagnose a current infection [6].

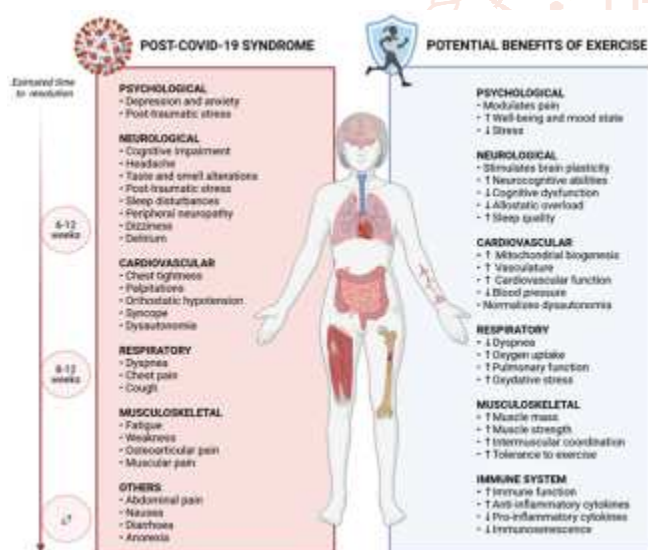


Figure 3: Post COVID conditions

[Source: <https://www.mdpi.com/1660-4601/18/10/5329/htm>]

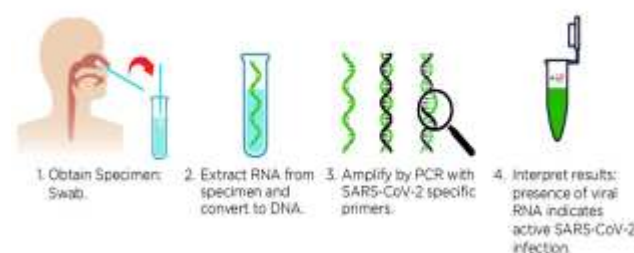
Psychiatric complications – Anxiety, depression, sleep disturbances, lack of concentration and suicidal tendencies have also been reported.

Anxiety and Depression – This can be seen in patients as a result of stress induced by the pandemic and battling the disease itself. COVID-19 isn't just an infection that affects the respiratory system, but has a huge impact on the mental state of a person.

Insomnia – This is a sleep disorder which affects the central nervous system where the sleep cycle of the person gets affected, leading to slower recovery.

Molecular Tests (Nucleic Acid Detection)

Diagnose active SARS-CoV-2 infections.



Antibody Tests (Serology)

Detect immune response to SARS-CoV-2 exposure

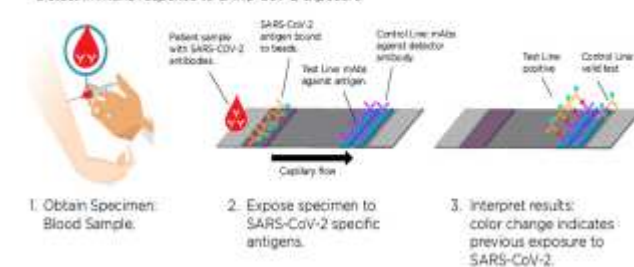


Figure 5: Testing of coronavirus

[Source: Comparison of SARS-CoV-2/COVID-19 test types and techniques.

<https://asm.org/Resource-Pages/COVID-19-Resources>]

VARIANTS OF CORONAVIRUS:

Viruses constantly change through mutation, and new variants of a virus are expected to occur. Sometimes new variants emerge and disappear. Other times, new variants persist. Multiple variants of the virus that causes COVID-19 have been documented in the United States and globally during this pandemic. Viruses constantly change and become more diverse. Some variations allow the virus to spread more easily or make it resistant to treatments or vaccines [7]. Some notable variants are

- **B.1.1.7 (Alpha):** This variant was first detected in the United States in December 2020. It was initially detected in the United Kingdom. This COVID-19 variant appears to spread more easily and might have an increased risk of hospitalization and death.
- **B.1.351 (Beta):** This variant was first detected in the United States at the end of January 2021. It was initially detected in South Africa in December 2020. This variant appears to spread more easily. It also reduces the effectiveness of some monoclonal antibody medications and the antibodies generated by a previous COVID-19 infection or COVID-19 vaccine.
- **P.1 (Gamma):** This variant was first detected in the United States in January 2021. P.1 was initially identified in travellers from Brazil, who were tested during routine screening at an airport in Japan, in early January. It has same effectiveness as beta variant.
- **B.1.617.2 (Delta):** This variant was first detected in the United States in March 2021. It was initially identified in India in December 2020. In June 2021 a variant of Delta with the K417N mutation begun to appear. The mutation, also present in the Beta and Gamma variants, raised concerns about the possibility of reduced effectiveness of vaccines and antibody treatments and increased risk of reinfection. It has been nicknamed "Delta plus".

TREATMENT:

Treatment for patients with mild/asymptomatic disease in home isolation

- Patients must be in communication with a treating physician and report in case of any worsening.
- Continue the medications for other co-morbid illness after consulting the treating physician.
- Patients to follow symptomatic management for fever, running nose and cough, as warranted.
- Patients may perform warm water gargles or take steam inhalation twice a day.

- When to seek immediate medical attention: Difficulty in breathing, Decrease in oxygen saturation ($SpO_2 < 94\%$ on room air), Persistent pain/pressure in the chest [8].

Optimal supportive care like oxygen for severely ill patients and those who are at risk for severe disease. More advanced respiratory support such as ventilation for patients who are critically ill.

Dexamethasone is steroid that can help to reduce the duration on a ventilator and save lives of patients with severe and critical illness.

Results from the WHO's Solidarity Trial indicated that *remdesivir*, *hydroxychloroquine*, *lopinavir/ritonavir* and interferon regimens appear to have little or no effect on 28-day mortality or the in-hospital course of COVID-19 among hospitalized patient [9].

Plasma therapy:

Plasma therapy, scientifically called convalescent plasma therapy, is a treatment method employed to combat COVID-19. If a person recovered from COVID-19, they have developed certain antibodies. These are proteins produced in our body to fight infections. In plasma therapy, doctors use plasma from recovered persons. Doctors boost the ability of severely affected patients by injecting the convalescent plasma into their blood. They also prevent moderately affected persons from becoming critically ill. But Why plasma therapy? In certain cases, treatments fail to cure COVID-19, and they grow extremely sick. Such patients do not respond to treatment. This raises the risk of acute respiratory distress syndrome (ARDS), an extreme lung condition. Such people may require the assistance of equipment like a ventilator to restore normal breathing. Organ failure is also a real possibility for such patients. Convalescent plasma therapy may help these people where other methods fail. Convalescent plasma therapy may also help people like health workers or family members of patients with COVID-19. Doctors can enrol a COVID-19 patient in convalescent plasma therapy under a special access program. Such programs are executed at critical times when there are no existing cures to disease. The method might answer questions regarding the disease while also providing improved methods for further treatment [10].

Effects of COVID-19 Treatment Or Hospitalization

Effects of COVID-19 treatment and hospitalization can also include post-intensive care syndrome (PICS), which refers to health effects that remain after a critical illness. These effects can include severe weakness and post-traumatic stress disorder (PTSD).

PTSD involves long-term reactions to a very stressful events.

Immunosuppressive drugs (tocilizumab, itolizumab) can lead to fulminant secondary infections and opportunistic infections. Prolonged steroid usage can lead to hyperglycemia, secondary infections.

PREVENTION:

Facemask and covering:

Face masks will not prevent the spread of SARS-CoV-2 on their own. They must be used in conjunction with other preventative measures. There are several different types of face masks available, and as such, there is different advice on how to wear, remove, and wash them safely.

Face masks are worn primarily to protect other people from the wearer, who may be asymptomatic or presymptomatic and able to pass on the virus unknowingly. It is important to understand the difference between pre- and asymptomatic people.

Presymptomatic means a person is not currently showing symptoms but will become sick and show symptoms in the future. Asymptomatic means a person is infected but is not currently showing symptoms and will never show symptoms. Both pre- and asymptomatic people are capable of passing on SARS-CoV-2, although presymptomatic people are more likely to spread the virus. This is why facial coverings are necessary for everyone when they are in public spaces. A person cannot be entirely certain whether they are pre- or asymptomatic and unknowingly spreading the virus [11].

Medical masks: Before putting on a medical mask, clean the hands with alcohol hand rub or soap and water for 20 to 60 seconds. Do not use a mask that has been worn before or is damaged, and do not touch the mask while it is being worn. To put on a medical

mask, only touch the straps behind the ears. Medical masks usually have a metal strip that should be pinched when the mask is first put on to bend to the shape of your nose. This prevents any gaps in the mask that may allow infected particles to enter or leave the mouth and nose. To take off a medical mask, clean the hands, and remove with the straps. Do not touch the front of the mask. Lean forward and pull the mask away from the face. Dispose of medical masks as soon as they are removed into a closed bin or container. They are single-use only.

Fabric masks: The important aspects of a fabric mask are breathability and fit. Fabric masks should consist of three layers of fabric. The WHO recommends that the inner layer is an absorbent material, the middle layer is a non-woven, non-absorbent material and the outer layer is a non-absorbent material. The mask should be an appropriate shape to fit closely over an individual's nose, cheeks and chin, and should be held in place without having to be adjusted. Before putting on a fabric mask, it is important to wash the hands. Do not use the mask if it is damaged or dirty and change the mask if it becomes dirty or wet when it is being worn. Make sure that it covers the mouth and nose, as this is where the virus can enter and exit the body. While wearing the mask, do not touch the front of the mask and adjust the mask using the straps. Do not touch the front of the mask before, while, or after wearing a mask. After taking off the mask, wash it with hot water and soap or detergent and store the mask in a clean, sealable bag if it needs to be worn again. Always wash your hands after putting the mask away. Do not share masks with other people.

Vaccines:

Vaccines play a major role in the prevention of coronavirus. Some of them include

TABLE 1: VACCINES AND THEIR DETAILS

	Covaxin	Covishield	Sputnik v	Pfizer	Modrena
Developed by	Bharat Biotech International Ltd with the Indian Council of Medical Research (ICMR) - National Institute of Virology (NIV).	Oxford University and AstraZeneca and manufactured by the Serum Institute of India (SII).	Gamaleya Research Institute of Epidemiology and Microbiology in Russia.	The German company Bio NTech.	The United States National Institute of Allergy and Infectious Diseases (NIAID) and the Biomedical Advanced Research and Development Authority (BARDA).

Developed with	Whole-Virion Inactivated Vero Cell-derived technology. It is a inactivated viral vaccine.	Viral Vector-based Technology to carry the COVID-19 spike protein into the cells of humans.	a modified replication-defective adenovirus of a different serotype, to include the protein S-expressing gene of SARS-CoV-2 virus.	mRNA, lipids, potassium chloride, monobasic potassium phosphate, sodium chloride, dibasic sodium phosphate dihydrate and sucrose.	mRNA, lipids, tromethamine, tromethamine hydrochloride, acetic acid, sodium acetate trihydrate, and sucrose.
Doses	2 shots	2 shots	2 shots	2 shots	2 shots
Interval between two shots	4 to 6 weeks	12 to 16 weeks	21 days	21 days	28 days
Effectiveness	78-100% (after phase 3 trail)	70-90%	91.6 %	94%	94.1%

Social and physical distancing

Social and physical distancing refers to the practice of maintaining 2 meters (6 feet) distance between other people outside of home. If a person becomes sick at home, anyone living with them should also keep a distance from them at all times. Distancing is especially important for those who are high-risk, such as the over 60s and those with existing medical conditions that could lead to serious complications if they contract COVID-19. Using a face mask does not negate the need for social or physical distancing.

Hygiene measures

➤ Personal hygiene

Regular and thorough hand washing is a key preventative measure in COVID-19. If there is no soap or water available, use an alcohol-based hand sanitizer or rub that contains at least 60 percent alcohol. Hands should be washed in soap and water for 20 to 30 seconds and hand sanitizer should be used for 30 to 60 seconds until hands feel dry. You should avoid touching the nose, mouth, or eyes if you have not washed your hands. Dispose of used tissues properly and wash your hands immediately after you cough or sneeze. If you cough or sneeze around others who do not have a face mask on, cough or sneeze into the elbow, not the hands. Do not spit when coughing or sneezing.

➤ Cleaning surfaces

Clean and disinfect all surfaces that are regularly touched daily. Objects that can transmit viruses are called fomites. To clean surfaces, use detergent or soap and water, and then a household disinfectant.

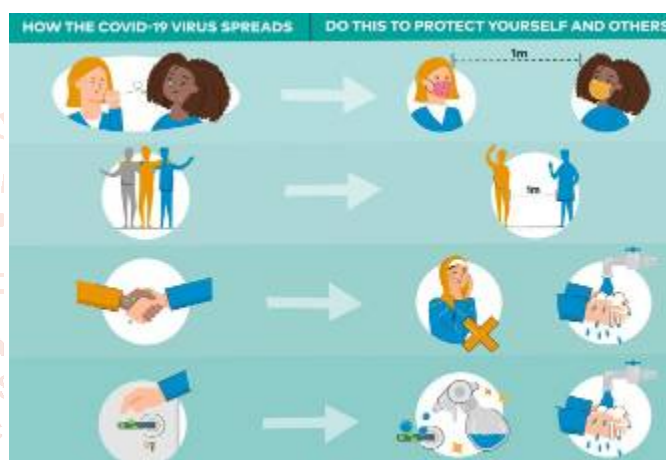


Figure 6: Preventive measures

[Source:

<https://www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public>]

CONCLUSION:

The novel coronavirus (COVID-19) spreads so rapidly which has changed the rhythm of the globe. It has become over responsibility to stop the spreading of coronavirus. We should get vaccinated and must follow the preventive measures in order to protect our beloved ones and our society. We must get out of this tough situation and make a world a pleasant one for the future generation.

Acknowledgment

The authors are thankful and acknowledge to the management of Dr. N. G. P. Arts and Science College, Coimbatore, Our college principle, Deans of Dr. N. G. P. Arts and Science College, Coimbatore as well as all faculty members and our guide, Department of Microbiology, Dr. N. G. P. Arts and Science College, Coimbatore for providing constant support for the entire work. (Communication number: DRNGPASC 2020-21 BS086)

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